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USER AUTHORIZED IGNITION SYSTEM

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ABSTRACT

Unauthorized driving is one of the main reasons for road accidents. The vehicle system is designed in such a way that the person who has the key is eligible to drive irrespective of whether he/she has a licence. This document defines a method to make sure that every vehicle on road is driven by a person who has been issued a driving licence by the government. The fingerprint is linked with the user's driving licence. The fingerprint will be linked to the driving licence using his/her Aadhaar card. This fingerprint is used as a key for legal authentication and bike ignition. Thus it saves the bulky hardware required to scan the licence. The mode of legal authentication is entirely shifted from a driving licence to the user's fingerprint. It leads to paperless authentication, protection from document forging and less accidents. The system comes as an add-on package which can be integrated with any vehicle presently available in market.

KEYWORDS: Ignition System, Starter, Key, Android Application, Fingerprint Authentication and User Authorized Ignition System (UAIS)

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Original Article

INTRODUCTION

Issuing licence in India is a strict process. But, the major drawback is that the system does not check whether every vehicle is driven by a person who has got driving licence. There is no relation between the fact that a person has got licence and the person driving the vehicle has got driving licence. These are two independent systems. And it is just a matter of chance that a person is caught on road by a traffic police because he has no driving licence.

There have been recent developments in this sector where the vehicle is ignited only if it recognises the driver. But even this system fails to cross check whether the driver is authorized to drive or not. Another development is that a system has been developed that first scans a driving licence and then ignites the vehicle engine. But the system is bulky and expensive. So it was important to design a small and effective system to authorize the vehicle driver by the government every time he/she starts a vehicle. This would make sure that if a vehicle is running on road, the driver is ought to have a licence.

Problem Statement

Design and implement a system that would first check whether the user is legally authorised to drive and then crank the engine.

Environment

The system requires a wireless communication model, authentication system and power source. If thought through, extra hardware needs to be installed on the bike to make the system work. But after careful observation this system can be achieved without any extra hardware. To be more specific, the authentication can be done by using a Smartphone. The smart phones come with a fingerprint scanner. The fingerprint will be scanned using UAIS app. This scanned fingerprint will be compared with the fingerprint in the central server. The fingerprint in the central server is linked with his/her driving licence. If the fingerprint scanned by the phone is found in the database a signal will be generated. The signal can then be transferred through Bluetooth to the console / circuit on bike. This circuit after receiving the signal switches on the ignition system. The entire model is based on the assumptions that the user has a smartphone and an UAIS app is installed on it. The smart phone does the work of crosschecking the current user fingerprint with that stored in the government database. Thus it reduces the need of extra hardware and power source for legal authentication of the user. This entire process will take a time span of maximum two seconds which is equivalent or even less than the older manual method of switching on the bike.

System Model

We have divided the entire project into three systems. These divisions have been done based on the requirements like database, authentication module and the relay system.

- Alpha
- Beta
- Gamma
- **Alpha Phase**

The alpha phase denotes the database to be created. The database contains information regarding the driving licence of the users. These driving licences should then be linked to the respective fingerprints of the licence holders. Aadhaar cards given to Indian citizens contain biometric information. So Aadhaar card is one of the best ways to link fingerprints to driving licence.

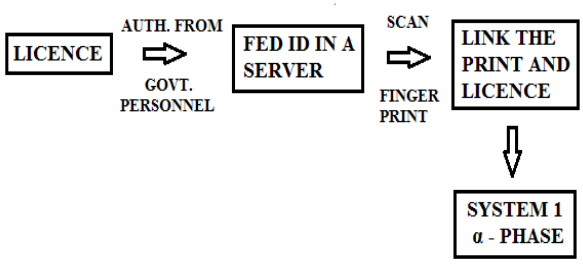

Figure 1: Block Diagram of Alpha Phase

- **Beta Phase**

Beta Phase denotes the authentication phase. The authentication is to be done by an android app. At first the android app uses the fingerprint scanner in smartphones to scan user fingerprint. These prints are then used to find a match in the database created in Alpha Phase. If a match is not found then it signifies that the user has no valid driving licence.

The request is dismissed and the vehicle won't start. If a perfect match is found then a signal is sent to the Ignition system.

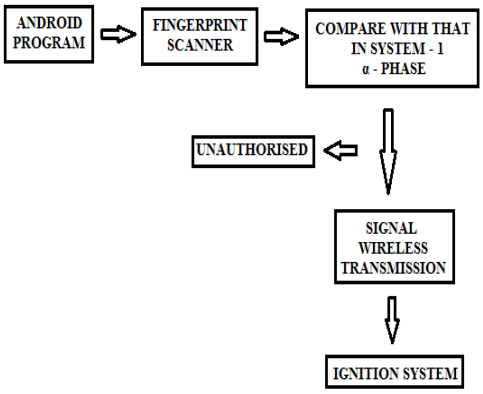

Figure 2: Beta Phase of UAIS

- **Gamma Phase**

The signal to the ignition system from beta phase is transferred via Bluetooth. The Bluetooth module on the ignition system feeds the signal to the micro controller. The micro controller used is Atmega 16. The micro controller then gives command to toggle the relay. There are two relays: one for the ignition key and the second one for the starter button. When the fingerprint is scanned the signal sent, starts the vehicle. There is a button on the app to switch of the key. The micro controller on receiving the off command switches off the vehicle.

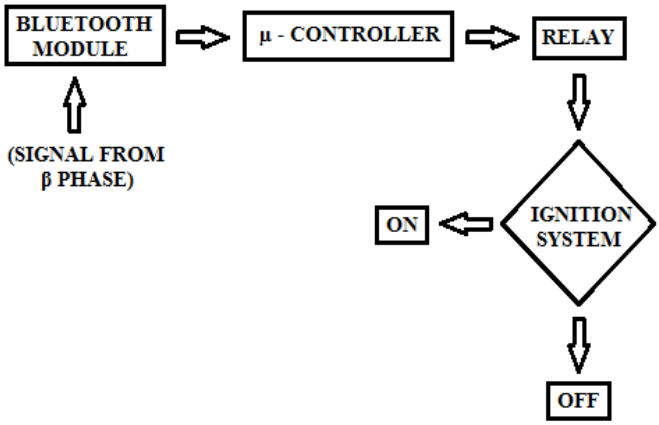

Figure 3: Gamma Phase of UAIS

Requirements for UAIS Circuit

On receiving signal from the Smartphone regarding authorization, the circuit should turn the key on. Then the starter should be in closed position for 2 seconds. Other than these functions there should be a reboot button on the circuit that will help pair new devices. These should be a power off button on the circuit that will prevent from draining energy when the bike is not in use for a substantial period of time.

The circuit is divided into two parts:

- The Relay system
- The Bluetooth module

When the starter key is pressed, the starter motor draws huge current which leads to very less available voltage. The voltage decreases because the power available is constant. The voltage at this particular instant falls below a critical level. Below this level the circuit shuts down and the relay corresponding to the ignition key is switched off. Thus the entire power system of the bike shuts down. The solution for this problem is to divide the circuit into two parts. Those parts have primary and secondary power sources. The primary power source is given to the section containing relays. The secondary power source is given to the Bluetooth module. The primary power is drawn from the bike battery, while the secondary one is supplied by a 12 V DC battery.

Once the ignition key is switched on, the starter key has dual access. It can be controlled through smartphone as well as manually from the bike. The dual access was included to facilitate starting the bike at signals or if the bike stops midway on road so every time you don't need the Smartphone to start the bike unless and until the ignition is on.

Android App

Android app called UAIS is the main component of UAIS system, which actually does the authentication process. Vehicle is connected to the mobile app via Bluetooth. As soon as mobile comes in the vicinity of the vehicle, it gets connected automatically to UAIS module. When user opens the app for first time, app will get connected to the government server and will ask for authorization of user. If the user has the driving licence and if it is linked to the AADHAAR card then app will ask for the biometric proof i.e. fingerprint. Fingerprint scanner in Smartphone will act as a user's identification apparatus for approving legal driving permission for particular vehicle. As soon as government server approves user's driving licence and fingerprint, app will crank the engine. This authentication information is stored in the app. Next time when the same user scans his/her fingerprint, the authentication is done in the phone itself. The UAIS app based on the first authentication information remotely approves the user.

Once the fingerprint is scanned the starter button has got dual access. The user can use the starter button on the bike to start the bike. This facility is introduced because of the general conditions like, user is at the signal and he/she has to switch off the engine in order to save the fuel, then he can switch off the engine by using Engine OFF key which is already provided by the bike manufacturers. Also problems like low fuel level or in case of other engine problems, if engine gets off automatically then in that case user is not required to ignite the engine by using the app, in such situations he /she can use the starter key for igniting the engine. When user no more wants to drive the vehicle for next few minutes or hours, then he can switch off the engine by using OFF button on the app. Once the system is shut down using the app then it will require fingerprint authentication to start it again.

Now unless the same or some other known user among the master users want to use the vehicle, the engine will not get cranked and no one will be able to use the vehicle. The next time user wants to drive the vehicle then he/she has to do the authentication process. These will help the government to decrease the illegal driving cases which lead to accidents. Because every single vehicle will now be driven by government authorised user.

Implementation Plan

For the initial testing UAIS was installed on a single bike. This actually checked the efficiency of the model and the app. It ensures strong connectivity between the phone and the vehicle. But what it failed to ensure was the network structure when large number of vehicles are connected under UAIS. So the proposed plan would be to implement the system on a set of vehicles. The potential targets are zoomcar, ola, uber. The results and data obtained from them would

help in making further changes, so that it can be implemented on large scale.

Analysis

The present analysis is based on the UAIS system installed on a single vehicle. The working was flawless. The connectivity was good. The system is a great alternative to ensure authorised driving. The system will put ignition key, licence and all related documents out of the picture. It is a way towards digitisation. The results regarding the network structure is still to be retrieved.

Future Scope

Fuel level indicator, GPS module and PUC check module can be added to UAIS module as a future development, with which user can check the fuel level and trace the current location of his/her vehicle. Along with the information such as current user of any vehicle, government will also get the PUC status of all vehicles in order to monitor the vehicle conditions.

CONCLUSIONS

UAIS is used to ensure legally authorised driving of vehicles. Every time a user wants to drive the vehicle the driving licence is mandatory to start the vehicle. And this entire process is done using the user's fingerprint In this way the user is not required to carry his/her driving License and keys, because User's fingerprint represents the key and the licence.

REFERENCES

1. *M. Puthanial, S.Rajeshwari. Vol 3. Issue5, May 2014. Android and Bluetooth Technology Enabled Remote Control Using Smart Phone. IJAREEIE Journal*
2. *Karthikeyan.a , Sowndharya.j. Fingerprint Based Ignition System, International Journal Of Computational Engineering Research, Issn: 2250–3005*
3. *Smita S. Mudholkar, Pradnya M. Shende, Biometrics Authentication Technique For Intrusion Detection Systems Using Fingerprint Recognition, International Journal Of Computer Science, Engineering And Information Technology (Ijcseit), Vol.2, No.1, February 2012*
4. *Antti Stén, Antti Kaseva, Teemupekka Virtanen. Fooling Fingerprint Scanners - Biometric Vulnerabilities of the Precise Biometrics 100 SC Scanner, 4th Australian Information Warfare and IT Security Conference 2003*
5. *Muhhammad Ali Mazidi, AVR microcontroller programming in assembly and C, PEARSON publications*